Cleaning the Air with a Zero-Emission Fleet

California's transportation sector contributes nearly 40 percent of the state's greenhouse gas emissions. To help clean California's air, Governor Brown signed *Executive Order B-16-2012* in 2012 setting a statewide goal to reduce, by 2050, greenhouse gas emissions from the transportation sector to an amount that is 80 percent less than the state's 1990 levels. It also requires state agencies to increase their zero-emission vehicles through normal fleet replacement, with at least 10 percent of annual light-duty fleet vehicle purchases being zero-emission vehicles by 2015 and at least 25 percent being zero-emission by 2020. Zero-emission vehicles in California will protect the environment, stimulate economic growth, and improve the quality of life in the state. Incorporating zero-emission vehicles into the Caltrans fleet will help us achieve our goal of meeting the executive order requirements while also providing a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability.

Zero-Emission Vehicle Point System

Vehicle Type	Minimum Range	Maximum Range	Credit Ratio
Battery electric vehicle			1:1
Low-range plug-in hybrid vehicle	10	19	5:1
Mid-range plug-in hybrid vehicle	20	34	3:1
Long-range plug-in hybrid vehicle	35	49	2:1
Extra-long-range plug-in hybrid vehicle	50	n/a	1:1

Source: Division of Equipment

Meeting the Zero-Emission Requirement

For each electric vehicle Caltrans purchases, we earn credit toward fulfilling our 10 percent zero-emission vehicle requirement. Battery electric vehicles earn one full credit each because they are pure zero-emission vehicles and use no gasoline. The Nissan LEAF, with a range of about 80 miles, and the Toyota Rav4, with an estimated range of 100 miles, are examples of battery electric vehicles.

Because plug-in hybrid electric vehicles use gasoline, they are considered transitional zero-emission vehicles and earn partial credit based on their certified battery-only driving range. The Chevrolet Volt has an electric range of 35 to 49 miles and is considered a long-range, plug-in hybrid electric vehicle. This gives it a credit ratio of 2:1, or a half credit for each Volt we purchase.

California's Department of General Services defines zero-emission vehicles as pure zero-emission vehicles such as battery electric vehicles and hydrogen fuel cell vehicles. This means that to meet the executive order requirement by 2015, if Caltrans purchases 100 light-duty vehicles, 10 of them must be zero-emission vehicles, five of which must be battery electric or fuel cell vehicles.

Electric Vehicles

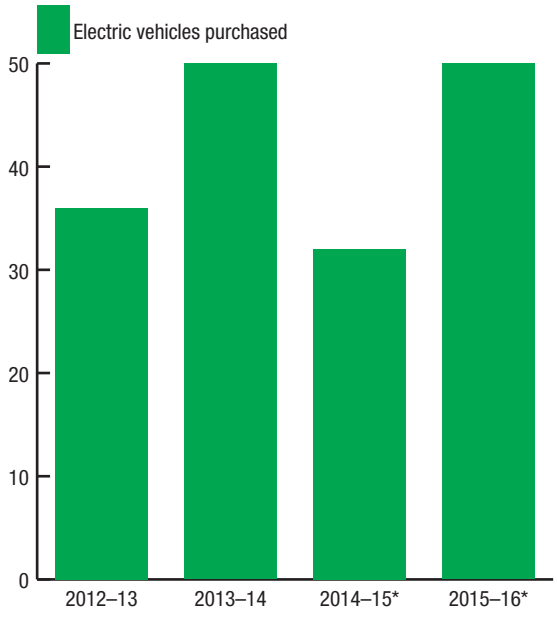
Not all electric vehicles are the same. A number of zero-emission electric vehicles are on the market and can be grouped into three main categories: hybrid electric vehicles, long-range electric vehicles, and battery electric vehicles.

Hybrid electric vehicles use either an electric motor or gas engine to move the wheels, but they use only electricity generated within the vehicle. These vehicles convert the energy used when braking into electricity to charge the battery. When the battery becomes drained, the gasoline engine turns on, allowing the vehicle to keep moving. The Toyota Prius is a hybrid electric vehicle, but hybrids also have a plug-in version that can use a power outlet to recharge the battery, or they can generate electricity on the go with the gasoline engine.

Extended-range electric vehicles have an internal gas engine to power an electric generator that charges the battery. Unlike hybrid vehicles, only the electric motor powers the wheels, and the gas engine only charges the battery. The Chevrolet Volt is an extended-range vehicle that can recharge by plugging into a power source.

Battery electric vehicles, such as the Nissan LEAF, are all-electric vehicles with no internal gas engine and must plug into an electric power source to recharge the batteries.

Caltrans' Zero-Emission Vehicle Fleet



Source: Division of Equipment

In 2013, through normal fleet replacement, we purchased our first plug-in electric vehicles: one Nissan LEAF battery electric vehicle and 35 Chevrolet Volt plug-in hybrid electric vehicles. These purchases earned Caltrans 18.5 zero-emission vehicle credits, one for the Nissan Leaf and 17.5 for the Chevrolet Volts. In 2014, we will purchase approximately 80 electric vehicles, meeting the requirement that at least 10 percent of our light-duty fleet purchases be zero-emission vehicles.

We constantly seek opportunities to increase our zero-emission vehicles that can perform the work required, but much of our fieldwork requires pickup trucks. Unfortunately, no battery electric pickup trucks are currently on the market. We are purchasing 50 Toyota RAV4 battery electric vehicles to meet the electric vehicle requirement, and are planning to incorporate aftermarket hybrid pickup trucks into our fleet until a more viable option is available.

We are hopeful that innovations in the zero-emission vehicle industry will increase electric vehicle feasibility and allow us to continue to meet or exceed the executive order requirements now and into the future—but these innovations come at a price. Aftermarket hybrid pickups cost about $85,000 each compared with an average of $30,000 for a conventional pickup. These steep prices and our existing new equipment budget limit our ability to fully meet existing fleet needs with zero-emission vehicles. Caltrans, as with all state entities, must weigh the pros and cons when deciding how to spend public dollars, and we strive to make the best decisions with the resources and information available to us.

Electric Vehicle Fueling

Electric vehicles show great promise in helping reduce California's greenhouse gas emissions, but the lack of charging stations is proving to be a formidable hurdle. To support and promote the use of zero-emission electric fleet vehicles, we are installing electric vehicle charging stations at Caltrans facilities throughout the state. We have installed, or are in the process of installing, charging stations at our 12 district offices and various equipment shops, maintenance stations, and construction sites. This will give us approximately 50 charging stations statewide and will further increase the feasibility of using zero-emission electric fleet vehicles.

Our stations, combined with investments by other public and private entities, are helping to provide the infrastructure necessary to support Governor Brown's zero-emission vehicle goals and to create a viable market for zero-emission vehicles. For example, the North County Transit District installed seven electric vehicle charging stations at their Oceanside Transit Center, the largest such station in North San Diego County. By helping electric vehicle drivers and potential fleet operators gain confidence in the technology and alleviate any range anxiety with the installation of the necessary infrastructure, we can continue to help reduce California's greenhouse gas emissions while supporting a strong, sustainable industry that can provide quality jobs in our communities.

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